

*Tables for the Application of Mr Innes's Method.*  
By Frank Robbins.

As an appendix to the preceding paper on "The Computation of Secular Perturbations," the author asked me to compute for each degree of the quadrant the logarithmic values (base 10) of the two functions of *iota* required for the convenient application of his method.

In the hypergeometric series  $F(a \beta \gamma x)$  in the first case

$$\alpha \text{ has the value } -\frac{1}{6} \quad \beta = \frac{7}{6} \quad \gamma = 2 \quad x = \sin^2 \frac{\iota}{2}$$

and in the second case

$$\alpha = \frac{1}{6} \quad \beta = \frac{5}{6} \quad \gamma = 2 \quad x = \sin^2 \frac{\iota}{2}$$

For convenience of designation the tables are headed *Minus F* and *Plus F* according to the sign of  $\alpha$ .

Vega's (1794) ten-figure logarithms, corrected by collation with the copy in use at H.M. *Nautical Almanac* Office, were used, and the natural values of the individual terms were taken out to ten places of decimals. These were obtained in duplicate for each end of the quadrant, and the whole were examined by differencing to the sixth order. Lastly, the seven-figure logarithms of the functions were taken from the eight-figure table of the Service Géographique de l'Armée (Paris, 1891), reference being made to Vega where the eighth figure was approximately five.

The log *Minus F* has been increased by 10 as customary, to avoid the inconvenience of printing negative characteristics.

The whole has been examined by Mr J. Abner Sprigge, of H.M. *Nautical Almanac* Office, so as to make it possible to use the tables with confidence in their accuracy to the seventh place.

(Iota).	Log plus F.	$\Delta_1$	$\Delta_2$	Log minus F.	$\Delta_1$	$\Delta_2$
1	0.0000023			9.9999968		
2	0092	+ 69	+ 46	9871	- 97	- 63
3	0207	115	45	9711	160	65
4	0367	160	47	9486	225	65
5	0574	207	46	9196	290	64
6	0827	253	46	8842	354	64
7	1126	299	45	8424	418	64
8	0.0001470	344	+ 46	9.9997942	482	- 65
		+ 390			- 547	

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(Iota).	Log plus F.	$\Delta_1$	$\Delta_2$	Log minus F.	$\Delta_1$	$\Delta_2$
9°	0.0001860		+ 47	9.9997395		- 64
10	2297	+ 437	45	6784	- 611	64
11	2779	482	46	6109	675	65
12	3307	528	46	5369	740	64
13	3881	574	46	4565	804	65
14	4501	620	46	3696	869	64
15	5167	666	45	2763	933	64
16	5878	711	47	1766	997	65
17	6636	758	45	9.9990704	1062	64
18	7439	803	46	9.9989578	1126	65
19	8288	849	47	88387	1191	64
20	0.0009184	896	45	87132	1255	65
21	0.0010125	941	46	85812	1320	64
22	11112	987	45	84428	1384	65
23	12144	1032	47	82979	1449	64
24	13223	1079	45	81466	1513	65
25	14347	1124	46	79888	1578	64
26	15517	1170	45	78246	1642	65
27	16732	1215	46	76539	1707	64
28	17993	1261	46	74768	1771	66
29	19300	1307	46	72931	1837	64
30	20653	1353	46	71030	1901	64
31	22052	1399	45	69065	1965	66
32	23496	1444	46	67034	2031	64
33	24986	1490	45	64939	2095	65
34	26521	1535	46	62779	2160	64
35	28102	1581	46	60555	2224	66
36	29729	1627	45	58265	2290	64
37	31401	1672	46	55911	2354	65
38	0.0033119	1718	+ 45	9.9953492	2419	- 65
		+ 1763			- 2484	

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(Iota).	Log plus F.	$\Delta_1$	$\Delta_2$	Log minus F.	$\Delta_1$	$\Delta_2$
39	0.0034882		+ 45	9.9951008		- 65
		+ 1808			- 2549	
40	36690		46	48459		64
		1854			2613	
41	38544		46	45846		66
		1900			2679	
42	40444		45	43167		65
		1945			2744	
43	42389		45	40423		64
		1990			2808	
44	44379		45	37615		66
		2035			2874	
45	46414		46	34741		64
		2081			2938	
46	48495		44	31803		66
		2125			3004	
47	50620		46	28799		64
		2171			3068	
48	52791		46	25731		66
		2217			3134	
49	55008		44	22597		65
		2261			3199	
50	57269		45	19398		65
		2306			3264	
51	59575		45	16134		64
		2351			3328	
52	61926		45	12806		66
		2396			3394	
53	64322		45	09412		65
		2441			3459	
54	66763		45	05953		66
		2486			3525	
55	69249		45	9.9902428		64
		2531			3589	
56	71780		44	9.9898839		66
		2575			3655	
57	74355		45	95184		64
		2620			3719	
58	76975		45	91465		66
		2665			3785	
59	79640		44	87680		65
		2709			3850	
60	82349		44	83830		65
		2753			3915	
61	85102		45	79915		65
		2798			3980	
62	87900		44	75935		65
		2842			4045	
63	90742		44	71890		65
		2886			4110	
64	93628		44	67780		65
		2930			4175	
65	96558		44	63605		65
		2974			4240	
66	0.0099532		45	59365		65
		3019			4305	
67	0.0102551		43	55060		65
		3062			4370	
68	0.0105613		+ 43	9.9850690		- 65
		+ 3105			- 4435	

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(Iota).	Log plus F.	$\Delta_1$	$\Delta_2$	Log minus F.	$\Delta_1$	$\Delta_2$
69	0.0108718		+45	9.9846255		-65
		+3150			-4500	
70	111868		42	41755		65
		3192			4565	
71	115060		44	37190		64
		3236			4629	
72	118296		43	32561		65
		3279			4694	
73	121575		44	27867		65
		3323			4759	
74	124898		43	23108		64
		3366			4823	
75	128264		42	18285		66
		3408			4889	
76	131672		43	13396		63
		3451			4952	
77	135123		43	08444		64
		3494			5016	
78	138617		42	9.99803428		65
		3536			5081	
79	142153		42	9.99798347		64
		3578			5145	
80	145731		43	93202		64
		3621			5209	
81	149352		41	87993		64
		3662			5273	
82	153014		42	82720		63
		3704			5336	
83	156718		42	77384		64
		3746			5400	
84	160464		41	71984		64
		3787			5464	
85	164251		42	66520		62
		3829			5526	
86	168080		40	60994		64
		3869			5590	
87	171949		40	55404		62
		3909			5652	
88	175858		42	49752		64
		3951			5716	
89	179809		+40	44036		-62
		+3991			-5778	
90	0.0183800			9.9738258		

*Description of the 30-inch Photographic Reflector of the Helwân Observatory.* By J. H. Reynolds.

There has recently been added to the equipment of the Khedivial Observatory at Helwân, near Cairo, a photographic equatorial reflector of 30-inch aperture: before giving a description of this instrument, a little explanation as to its origin would not be out of place. About five years ago one of the 30-inch Mirrors of Standard Astrographic focal length, which were ground and figured by the late Dr Common, came into my hands. I originally purposed to employ the mirror for nebular photography in this country, and commenced designing a suitable mounting. A visit to Egypt in